leak test update

University of Minnesota

Yan Ke

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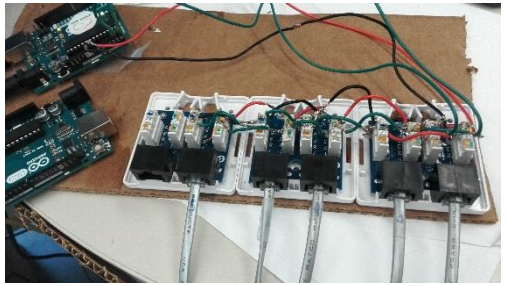
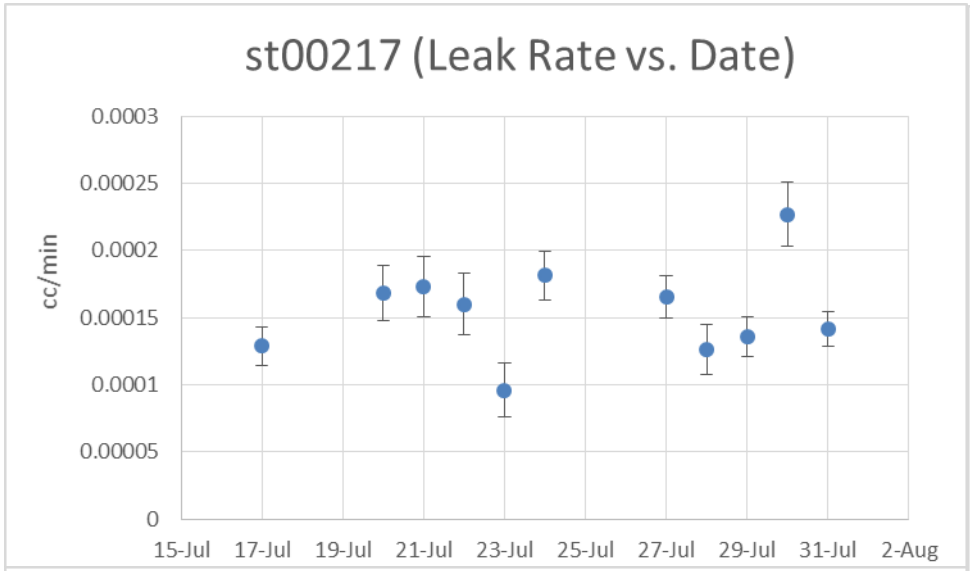
Apparatus progress

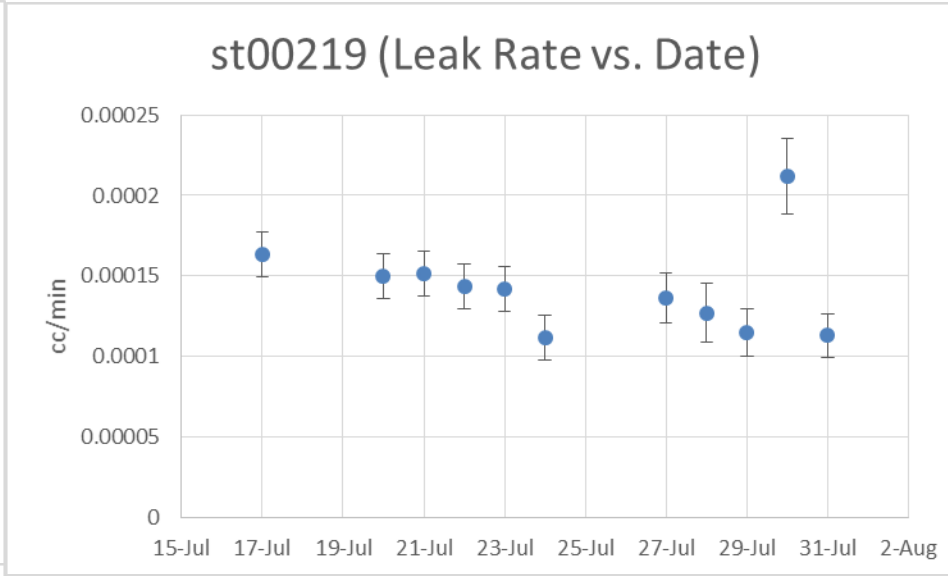
- We can run 5 sensors now.
  - The resistance on the wire between Arduino and sensor cannot exceed 1 ohm. Otherwise there will be a voltage drop on the wire. Previously the voltage drop was from the splitter. I replaced it with the design similar to the splitter in Fermilab.

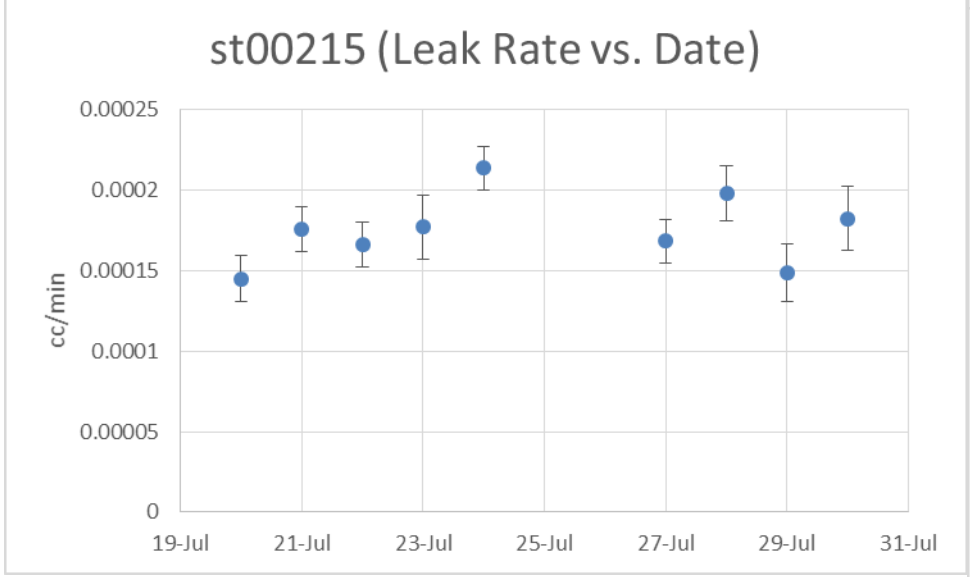


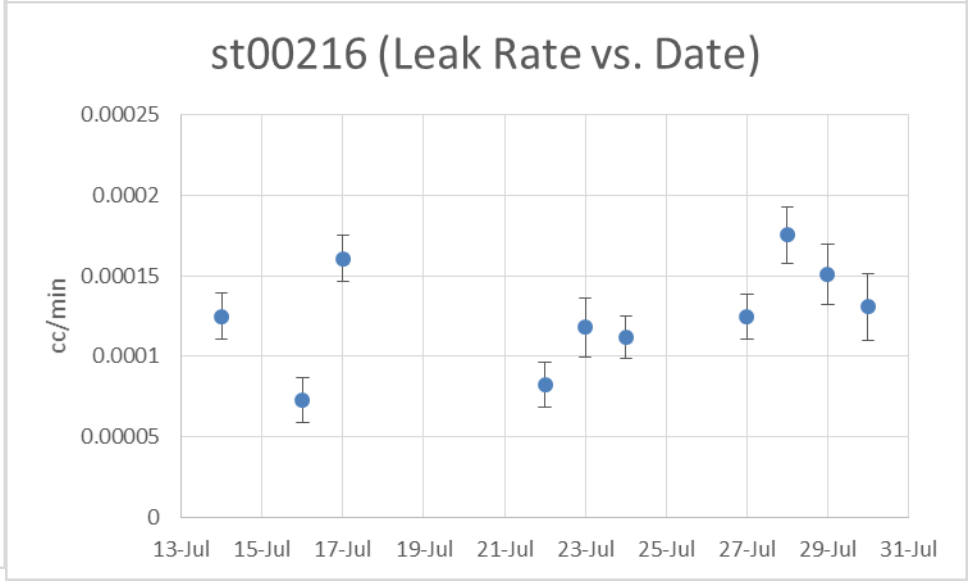
- Dan's new python code has been running here. I deleted the barcode thing for convenience. Will add it back next week when we get the scanner cable.

Consistency test result



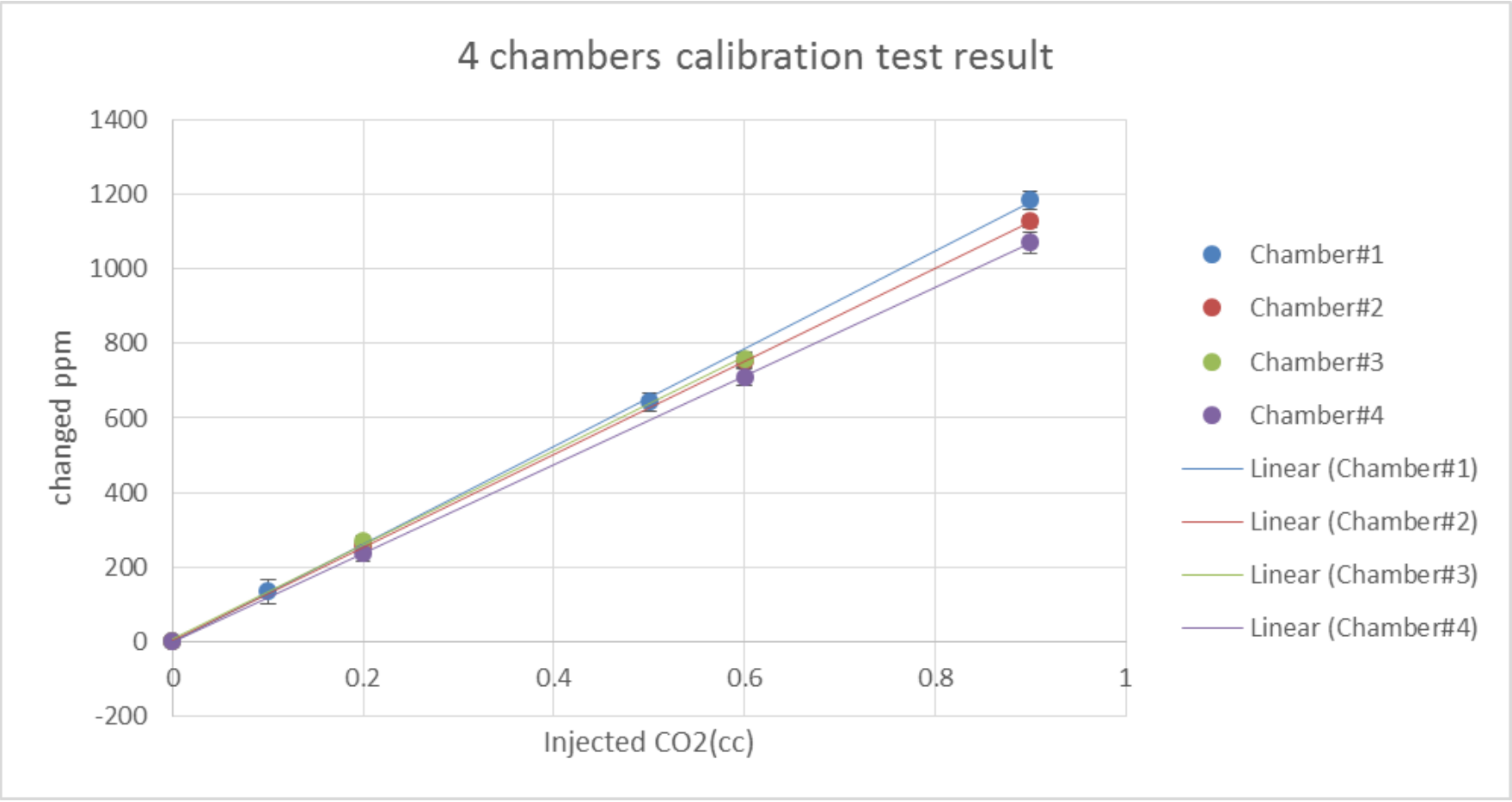






- St00217 and st00219 was flushed with N2 right after each measurement.
- The viton of st00215 was replaced each time before measurement
- The viton of st00216 was replaced right before measurement on July 16,22,24,28,30

Calibration test result



- For each data point for chamber#2,3,4, I took half an hour to take data before inject CO2 and 1 hour to take data after inject CO2. For chamber #1, I took data for 15 mins before and after injection.

Calibration test result

Without (0,0)				With(0,0)		
Chamber	volume	uncertainty		Chamber	volume	uncertaint
#1	379.5297	20.90748		#1	382.2145	16.78618
#2	402.7451	19.38371		#2	399.2278	16.89449
#3	406.8938	24.94791		#3	391.4446	18.00265
#4	421.7096	25.16194		#4	421.7347	19.10541

- The Table on the left is the volume estimate without counting the point (0,1) the last slide.
- The Table on the right is the volume estimate if we count in the point (0,1). Because if we don't inject CO2, the changed ppm value should be the leak rate of the chamber. The uncertainty of this point is 2. I got this number from the data of chamber leak test.

Calibration test

- The fan of chamber #3 might need to be adjusted. It need around an hour for the 0.6ml injected CO2 spread evenly inside the chamber. But it only takes 5 mins for other chamber.
- The uncertainty of volume is determined by uncertainty of the CO2 concentration and uncertainty of calibration slope. They have the same magnitude. Do we want to order pure CO2 for more accurate result?
  - $\sigma_{volume} = Volume \times \sqrt{\left(\frac{\sigma_{ratio\ of\ co2}}{ratio\ of\ CO2}\right)^2 + \left(\frac{\sigma_{slope}}{slope}\right)^2}$